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EXAMINER

GANTT, ALAN T

ART UNIT PAPER NUMBER

2684

DATE MAILED: 07/18/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/375,906

Applicant(s)

ABETA ET AL.

Examiner

Alan T. Gantt

Art Unit

2684

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 August 1999.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 2-6, 13 and 14 is/are allowed.
- 6) ☒ Claim(s) 1, 7-9, 11 and 12 is/are rejected.
- 7) ☐ Claim(s) 10 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2, 4, 7.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Specification

The disclosure is objected to because of the following informalities: The Summary section of the specification is a rehash of the claims and even includes claim numbers. The Summary section should give an overview of the applicant's invention in a concise manner.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1, 7-9, 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wright.

Regarding claims 1 and 12, Wright discloses a system and method for transmitting digital data over a wireless channel using periodically transmitted, differentially encoded pilot words to allow a receiver to rapidly synchronize with the transmitter. Each differentially encoded pilot word comprises at least two pilot symbols that are separated by a fixed difference. Once the receiver becomes synchronized with the transmitter, the receiver uses the pilot symbols to perform channel estimation and compensation (Abstract). The fixed difference is of the pilot symbols within the differentially encoded pilot word where there is a fixed difference in

Art Unit: 2684

amplitude and/or phase. The pilot symbols of each pilot word are separated by one or more data symbols (col. 5, line 52 to col. 6, line 10 and col. 6, lines 52-65). On the transmission side, Wright uses a differentially encoded pilot word generator to generate a differentially encoded pilot word, which is then inserted into the digital data stream that already includes forward error correction encoding and interleaving and a constellation mapper that yield data symbols. Thus, the data sequence has been modulated (as called out in applicant's claims 3 and 14) by the means discussed above. Also the above process yields a combined symbol sequence by inserting pilot symbols into the data symbol sequence as required by applicant's claimed invention. The RF up-converter and antenna provide means for transmitting the combined symbol sequence. On the reception side, Wright has means for receiving the combined symbol sequence in the form of antenna, RF down-converter circuitry and filter that produce channel impaired symbols. The output of a sampler is fed to a differentially encoded pilot word detector and is also fed to a pilot symbol extractor. The pilot word detector detects the periodic position of differentially encoded pilot words within the symbol stream by repetitively calculating the difference between received symbols, and effectively searching for the periodic occurrence of the pilot difference within the calculated stream of difference values. To distinguish the differentially encoded pilot words in the symbol stream from groups of data symbols that are coincidentally separated by the same difference, the pilot word detector monitors the symbol stream over multiple pilot periods before determining the periodic position of the pilot words. Once the pilot words have been detected, the pilot word detector informs a pilot symbol extractor of the periodic location of the pilot words. The pilot symbol extractor then extracts the pilot symbols of the differentially encoded pilot words. The extracted pilot symbols are then provided to the channel estimator. The

Art Unit: 2684

remaining symbols are fed to a channel compensator. These remaining symbols are in the form of complex values that represent channel impaired data symbols (col. 9, line 27 to col. 10, line 22). Thus, Wright provides means for generating pilot blocks by extracting pilot symbols from the combined symbol sequence.

The channel estimator compares the amplitudes and phases of the extracted pilot symbols with the expected amplitudes and phases to thereby estimate the effects of the channel on the transmitted signal. The channel estimator performs the comparison with each pilot symbol of a differentially encoded word, and then uses the results to calculate the average attenuation and average phase impairment as the estimate. Estimates obtained over multiple pilot periods are then interpolated to generate symbol-specific adjustments to apply to the channel impaired symbols. The channel estimator outputs these symbol-by-symbol estimates to the channel compensator and deinterleaver (col. 10, lines 23-39). The channel compensator uses the output of the channel estimator to adjust or correct the amplitudes and phases of channel impaired data symbols (col. 10, lines 40-59). This process meets applicants claim limitation since the channel estimates of the data symbols are obtained through the averaging of the pilot symbols at different points within the differentially encode pilot word and the amplitude and phase proportionality (i.e., weighting) of position-specific pilot symbols are applied to the data symbols. Wright does not specifically provide for slots in his channel estimation scheme.

However, it would have been obvious at the time of the applicant's invention for Wright to make use of the each differentially encoded pilot word as a slot period since the Wright system acts on the pilot word exclusively to determine the required weighting or compensation

Art Unit: 2684

for the data symbols within the encoded word as is done for each slot for the applicant's invention.

Regarding claim 7, Wright allows the data and pilot symbol amplitudes to be varied by each differentially encoded pilot word where each pilot word may be seen as a slot.

Regarding claim 8, Wright allows for varying configurations of the differentially encoded pilot words and thus, would allow for the number of pilot symbols and data symbols to be the same within each differentially encoded pilot word.

Regarding claim 9, the pilot symbol extractor of Wright extracts only pilot symbols (yielding pilot blocks) and does this for each pilot word.

Regarding claim 11, with Wright, the compensation of the data symbol depends on the magnitude change of the pilot symbols closes to the data symbol in the differentially encode pilot word.

Allowable Subject Matter

2. Claims 10 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

Regarding claim 10, the pilot blocks are generated in manner not found, suggested, nor made evident by the prior art.

3. Claims 2-6, 13, and 14 are allowed.

The following is a statement of reasons for the indication of allowable subject matter:

Regarding claims 2, 3, 13, and 14, CDMA receivers or transceivers incorporating

Art Unit: 2684

combined symbol sequence processing that includes data symbols and pilot symbols where the combined symbol sequence is spread and despread as a unit were neither found, suggested, nor made evident by the prior art.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Jalloul et al. discloses a method and apparatus in WCDMA communication systems that include extracting pilot symbols.

Visotsky et al. discloses a communication device and method for interference suppression using adaptive equalization in a spread spectrum system.


Schmidl et al. discloses an iterative signal-to-interference ratio estimation for WCDMA.

Any inquiry concerning this communication from the examiner should be addressed to Alan Gantt at telephone number (703) 305-0077. The examiner can normally be reached between 9:30 AM and 6 PM within the Eastern Time Zone. The group FAX number is (703) 308-6306.

Any inquiry of a general nature or relating to this application should be directed to the group receptionist at telephone number (703) 305-4700.

Alan T. Gantt

Alan T. Gantt


DANIEL HUNTER
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600

Application/Control Number: 09/375,906

Art Unit: 2684

Page 7

July 13, 2002